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KING (CHINOOK) SALMON SPAWNING STOCKS IN CALIFORNIA'S CENTRAL VALLEY, 1974

Edited by

Steven N. Taylor

Anadromous Fisheries Branch

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ABSTRACT

This report covers the 22nd annual (1974) inventory of king salmon (Oncorhynchus tshawytscha) spawning populations in the Sacramento-San Joaquin River system. It is a compilation of estimates of fall- and spring-run king salmon spawning populations for every stream in the Sacramento-San Joaquin system which supports a significant spawning run, and partial counts of late fall- and winter-run king salmon.

Estimates are made from counts of carcasses and live fish on spawning areas, aerial redd counts, and counts of fish migrating past Red Bluff Diversion Dam.

The estimated 1974 escapement of fall-spawning (fall- plus spring-run) king salmon in the Central Valley is 244,054 fish. This figure is 81% of the historic (1953-1973) average of 301,000, and is down 14% from the 1973 estimate of 283,000.

Appendix Tables present fall- and spring-run spawning escapements by stream for 1974, and by major streams for the years 1964 through 1974.

1/ Anadromous Fisheries Branch Administrative Report No. 76-3. Submitted for publication February 1976.

INTRODUCTION

This report covers the 22nd annual California Central Valley king salmon spawning stock inventory.

The California Central Valley (Sacramento-San Joaquin River system) is the principal producer of king salmon caught in California's ocean fisheries. Central Valley king salmon also contribute significantly to the ocean fisheries of Oregon and Washington.

Four different "runs" or "races" of king salmon are recognized in the Central Valley. These are:

(1) The fall run. These are the most numerous and the most ubiquitous salmon in the Valley. Most Central Valley streams that have regular salmon runs of any type have an annual fall run. Most fall-run fish spawn from the middle of October through December.

(2) The late-fall run. These fish are largely confined to the upper part of the Sacramento's main stem. They are usually larger than fish of either the fall or winter runs. Most spawn from January through March.

(3) The winter run. Most spawn in the Sacramento main stem above Red Bluff Dam. Spawning occurs from April into July.

(4) The spring run. Spring-run salmon were once widespread in the Valley but have disappeared from many of the streams they once utilized. Most of them spawn in September or early October.

Fall and spring runs in the Central Valley have been monitored since 1953. Regular monitoring of the late-fall and winter runs began in 1967, after construction of counting facilities at Red Bluff Diversion Dam. (Most Central Valley late fall- and winter-run king salmon spawn above the dam.)

For this report, all Central Valley streams known to support sizeable salmon runs were either surveyed, or the numbers of spawners estimated by counting at some point downstream from the spawning areas. Survey effort was concentrated in areas which are known to support the biggest runs.

METHODS

San Joaquin Tributaries and the Sacramento System below Red Bluff Diversion Dam

The 1974 fall- and spring-run king salmon spawning escapement estimates in the Sacramento River system south of Red Bluff Diversion Dam and in the San Joaquin system were based primarily on spawning bed surveys and carcass

counts. In some streams, carcasses were marked and released, and subsequent recovery rates of marked carcasses were a consideration in estimating the populations. The maximum number of survey trips that money and manpower limitations permitted was made on each stream. Unless otherwise stated (or if only one survey trip was made), all counted carcasses were cut in half to prevent recounting on subsequent trips. Surveys were sometimes supplemented by aerial redd counts. More details and special methods are presented under individual stream headings.

Sacramento River from Keswick Dam to Red Bluff Diversion Dam

Estimates of the total numbers of salmon utilizing the Sacramento River and its tributaries upstream from Red Bluff Diversion Dam during 1974 were based on daily counts made by the U. S. Fish and Wildlife Service at Red Bluff Diversion Dam. The counts were obtained by closed circuit television, coupled with a video tape recording system. Salmon passing through the fishway activate the system. The tapes are later viewed and interpreted. A portion of the passing fish are regularly diverted to the trapping facility adjacent to the east bank fishway, examined for stage of sexual maturity, and released. Each salmon checked was assigned to a particular run by estimating when it would spawn based on the examination.

Weekly counts were adjusted for periods when the fishway remained upen but no counts were made: during periods when the river was turbid, when flood conditions made it necessary to open the gates of the dam, and during night hours when the television system was turned off. Count adjustments for the daytime lapses were made by interpolation. Adjustment for the "night factor" consisted of multiplying the day counts by 1.042 (Hallock, IN Taylor, 1974).

The adjusted weekly counts were then separated into numbers of late fall-, winter-, spring-, and fall-run salmon according to the data gathered from the fish examined as they passed the dam.

The sport catch was then subtracted from the counts to obtain estimates of spawning populations.

SACRAMENTO RIVER SYSTEM FROM KESWICK DAM TO CHICO CREEK (FIGURE 1)

by

Frank A. Hall, Jr., and Richard J. Hallock
Anadromous Fisheries Branch

Sacramento River from Keswick Dam to Red Bluff Diversion Dam

High and turbid water made fishway counts at Red Bluff Diversion Dam impossible for six consecutive weeks in January and February, 1974 (Appendix Table 2). This lapse in counting occurred during the period that major portions of the 1973-74 late-fall and winter runs may have been migrating past the dam.

Because this lapse in counting was so prolonged, we believed that interpolation over these six weeks was unjustified. Our estimates of late fall- and winter-run spawning populations do not include fish which may have passed the dam during this period. (During the comparable six-week period in 1973, 15% of the late-fall, and 3% of the winter runs passed the dam.)

We adjusted our estimates for all other lapses in counting.

From December 30, 1973 through December 28, 1974, a total of 75,654 king salmon were counted as they passed Red Bluff Diversion Dam. Adjusting for periods of no counting increased this total to 93,324. During this same period, 12,611 salmon were examined and released at the trapping facility in the east bank fishway of the dam.

The sampling results indicated that the adjusted calendar year count consisted of 15,005 late fall-, 19,429 winter-, 3,932 spring-, and 54,958 fall-run salmon (Appendix Table 2). Though the 1974 calendar year count included total annual runs passing the dam for spring- and fall-run salmon, it represents only a part of the total annual runs of 1974 spawning late fall-, and winter-run salmon, since fish of these two races start passing the dam in one calendar year and complete their run during the following calendar year. Therefore, to estimate the 1974 spawning populations, we included the counts of 1973-74 late fall- and winter-run salmon dating back to October 14, 1973. We then subtracted the estimated sport catch, by run, from the counts.

Natural mortality occurring between the time salmon passed the dam and the time they spawned was not included in our calculations. It is probably insignificant: 98% of the 30,360 carcasses examined in the main stem from 1957 through 1966 were spent.

The estimated numbers of spawners, by race, are: 6,083 late fall-, 18,536 winter-, 3,800 spring-, and 53,154 fall-run fish (Table 1). Because of the prolonged lapse in counting in January and February, 1974, the estimates for the late-fall and winter runs are not directly comparable to estimates of other years.

Main Stem Sacramento River, and all Tributaries above Red Bluff Diversion Dam Except Battle Creek

The Distribution of Salmon above Red Bluff Diversion Dam

Some late fall- and winter-run salmon spawn in upper Sacramento River tributaries, but these races are primarily main-stem spawners. No surveys were conducted in any tributary during the period they may have been spawning there. Therefore, they are included in the main-stem estimates.

All fall- and spring-run salmon spawning above the dam in tributaries other than Battle Creek, are combined in this report with those spawning in the main stem of the Sacramento River. Battle Creek was the only tributary surveyed above the dam in 1974.

Redd counts, made during two airplane flights over the main stem of the Sacramento River on October 24 and November 8, 1974, showed the general salmon redd distribution of fall-spawning salmon, and indicate the relative numbers of salmon that spawned in different river sections above Red Bluff and above Vina (Appendix Table 5).

Late-fall, Winter and Spring Runs

All are included in the main stem estimates. Estimated spawning populations are as follows: Late-fall run, 6,083; winter run, 18,536; spring run, 3,800 (Table 1 and Appendix Table 3). The late fall- and winter-run figures do not include any fish passing the dam during lapses in counting early in 1974.

Fall Run

An estimated 49,253 fall-run salmon spawned above Red Bluff Diversion Dam in the Sacramento system (excluding Battle Creek) in 1974 (Appendix Table 3). This figure was obtained by subtracting 1,804 salmon caught by sportsmen above Red Bluff, and 3,901 salmon entering Battle Creek, from the 54,958 fall-run salmon migrating past Red Bluff Diversion Dam in 1974. The 49,253 total includes 1,429 salmon trapped at Keswick Dam and hauled to Coleman Hatchery for artificial spawning, and 2,234 trapped at Red Bluff Diversion Dam and hauled to the Tehama-Colusa Spawning Channel.

Table 1

Calculation of 1974 King Salmon Spawning Populations above Red Bluff Diversion Dam

Run	Fish passing Red Bluff Diversion Dam in calendar year 1973		Fish passing Red Bluff Diversion Dam in calendar year 1974		Total potential 1974 spawners in run		Sport catch above the dam in 1973 and 1974		Total 1974 spawning population by run
Late-fall run 1973-74	1,268	+	5,032[a]	=	6,300[a]	-	217	=	6,083[a]
Winter run 1973-74	0	+	19,116[a]	=	19,116[a]	-	580	=	18,536[a]
Spring run 1974	0	+	3,932	=	3,932	-	132	=	3,800
Fall run 1974	0	+	54,958	=	54,958	-	1,804	=	53,154
Late-fall run 1974-75	0		9,973[b]		0[c]		166[b]		0[c]
Winter run 1974-75	0		313[b]		0[c]		5[b]		0[c]
TOTALS	1,268		93,324[a]		84,306				81,573[a]

[a] Does not include any fish which may have passed the Dam during the six-week lapse in counting from January 13 through February 23, 1974 (See Appendix Table 2).

[b] This run started passing the Dam late in 1974, but was not completed in 1974. Additional salmon will be added to both the run and sport catch in early 1975.

[c] Fish in this run spawn in 1975, not 1974.

Battle Creek

Fall Run

An estimated 3,901 fall-run salmon spawned in Battle Creek during 1974. This total includes 1,607 salmon that entered Coleman Hatchery and were spawned artificially, and 2,294 that spawned in Battle Creek between Coleman Hatchery and the Sacramento River. It does not include 1,429 salmon trapped at Keswick Dam on the upper Sacramento River and hauled to Coleman Hatchery for artificial spawning (Appendix Table 4).

The estimate for numbers of salmon spawning in Battle Creek below Coleman Hatchery was made from carcass recovery data. Sixteen survey trips were made on lower Battle Creek, October 5, 1974 through January 18, 1975, and on Gover's irrigation ditch from October 6, 1974 through January 19, 1975. Carcass recovery conditions were very good during most recovery trips. A total of 1,460 carcasses was recovered (1,172 in Battle Creek and 288 in Gover's ditch), at an estimated recovery rate of 62% in Battle Creek and 74% in Gover's ditch (Appendix Table 4).

Spring Run

No estimate was made although a few were observed at the Coleman Hatchery fish diversion dam in June, 1974.

Main Stem Sacramento From Red Bluff Diversion Dam to Chico Creek

General

Stream flows in the main stem Sacramento River from Red Bluff Diversion Dam to Chico Creek during the fall of 1974 were generally good for salmon carcass recovery, except on December 4, 1974, when the daily mean flow near Red Bluff reached 575 m^3/sec (20,300 cfs). Throughout the balance of the salmon carcass recovery period, from early October to mid-January, 1975, conditions were good, with daily mean flows near Red Bluff remaining between 198 and 312 m^3/sec (7,000-11,000 cfs).

However, the relatively constant flows throughout the period failed to beach many carcasses, and recovery rates were slightly lower than in 1973. Frequent observation of some spawning areas indicated a substantially higher salmon spawning population in the main stem Sacramento than in 1973.

A few late fall- and winter-run salmon normally spawn in the Sacramento main stem between Red Bluff and Woodson Bridge. However, no surveys were conducted in 1974 during the period these fish would have been spawning there. No population estimates for these runs were attempted. A few spring-run fish normally spawn in this section of the main stem. All spring-run fish in this part of the main stem are included in the fall-run estimate.

Red Bluff Diversion Dam to Tehama (Fall Run)

An estimated 20,053 fall-run salmon spawned in the main stem of the Sacramento River between Red Bluff Diversion Dam and Tehama during 1974 (Appendix Table 3). This total includes 843 salmon that entered the Tehama-Colusa Spawning Channel, via Coyote Creek, and spawned there.

Spawning stock surveys in the main stem of the Sacramento River between Red Bluff and Tehama began on October 18, 1974 and ended January 14, 1975. During this period fourteen complete trips were made, and 230 salmon carcasses were recovered. Based on survey effort, and water conditions, we estimated that the recovery rate was 1.2%.

Tehema to Woodson Bridge (Fall Run)

An estimated 7,917 fall-run salmon spawned in the main stem of the Sacramento River between Tehama and Woodson Bridge during 1974 (Appendix Table 3).

Spawning stock surveys in the main stem of the Sacramento between Tehama and Woodson Bridge began on October 18, 1974 and ended January 15, 1975. During this period thirteen complete trips were made and 95 salmon carcasses were recovered. Based on survey effort and water conditions, we estimated that the carcass recovery rate was 1.2%.

Sacramento River Tributaries from Red Bluff to Chico Creek

General

Rainfall in the upper Sacramento Valley was near normal during the winter of 1974. However, substantial rains did not occur until the end of January, 1975, after the fall run was over. The low flow conditions resulted in a reduction of fall-run salmon spawning in tributaries such as Salt, Dry (Toomes), and Singer Creeks where the salmon runs are more inclined to fluctuate with the timing and amount of runoff. Fall run salmon spawning conditions in the regular established tributaries, such as Antelope, Mill, and Deer Creeks (which have higher and more consistent flows), were generally good. Recovery conditions were good in the fall of 1974.

Spring-, late fall-, and winter-run fish are known to spawn in some years in many of the Sacramento River tributaries from Red Bluff to Chico Creek. Their occurrence in these tributaries is influenced somewhat by stream conditions. These races are discussed in this section only where they were observed during the 1974 season.

Antelope Creek (Fall Run)

Ten survey trips were made on Antelope Creek between the Canyon Mouth (U.S.G.S. Gaging Station) and Highway 99-E, from October 11, 1974 through January 16, 1975.

Six trips were also made on branches (or overflow channels) of Lower Antelope Creek during this same period: 5 on Craig Creek and 1 on New Creek. Fifty-eight carcasses were recovered. The fall run was estimated to be 580, including 440 in Antelope Creek and 140 in Craig Creek. No carcasses or live salmon were observed in New Creek (Appendix Table 4).

Mill Creek

Spring Run. Thirteen days were spent between September 17 and October 16, 1974 surveying upper Mill Creek between Black Rock and the mouth of Little Mill Creek. This effort resulted in the equivalent of seven pack survey trips through the rugged Mill Creek Canyon. Recovery conditions were excellent. Five carcasses were recovered, and 119 live salmon were observed on spawning beds. The spring run in Mill Creek was estimated to be 1,500 in this stream section (Appendix Table 4).

Fall Run. Thirteen survey trips were made on Mill Creek, from the Los Molinos Mutual Water Company's upper diversion dam to its confluence with the Sacramento River, between October 7, 1974 and January 30, 1975. A total of 236 salmon carcasses was recovered. The fall run was estimated to be 944 (Appendix Table 4).

Deer Creek

Spring Run. Seven days were spent surveying the rugged upper Deer Creek Canyon between September 18 and October 18, 1974, from 1.6 km (1 mile) below the new Pacific Gas and Electric Company power line crossing, 16 km (10 miles) above Highway 99-E, to upper Deer Creek Falls. The creek was low and clear during most of the survey period, making observation and carcasses recovery conditions good. Two-hundred twelve live salmon and 158 redds were observed. The spring run was estimated to be 3,500 fish (Appendix Table 4).

Fall Run. Thirteen survey trips were made on lower Deer Creek, between October 11, 1974 and January 17, 1975. The principal area covered was from the mouth of Deer Creek to the County Road Bridge, which is located about 3.2 km (2 miles) upstream from the Stanford-Vina Dam. A total of 160 salmon carcasses was recovered. The fall run was estimated to be 640 salmon (Appendix Table 4).

Dry (Toomes) Creek (Fall Run)

Seven survey trips were made on Dry Creek between December 13, 1974 and February 26, 1975. The area covered was from the Canyon Mouth (Favinger Place) downstream to its confluence with the Sacramento River. Six live salmon were observed, and 46 carcasses were recovered. The fall run was estimated to be 60 salmon (Appendix Table 4).

Dye Creek (Fall Run)

Seven survey trips were made on Dye Creek between December 2, 1974 and January 13, 1975. The area covered was from the canyon mouth (Dye Creek Ranch) downstream to the Sacramento River. No salmon carcasses were recovered and no live salmon were seen (Appendix Table 4). No estimate of the fall run was made. However, some fingerling salmon were observed in the drying pools of lower Dye Creek in the spring of 1975.

Salt Creek (Fall Run)

Three survey trips were made on Salt Creek between November 27, 1974 and December 6, 1974. The area covered was from Salt Creek Canyon mouth downstream to Highway 99-E. No carcasses or live salmon were observed, and no spawning population estimate was made for Salt Creek. However, some fingerling salmon were observed in the drying pools of lower Salt Creek in the spring of 1975.

Singer Creek (Fall Run)

Six survey trips were made on Singer Creek between November 15 and December 20, 1974. The area covered was from two miles above Lassen Road crossing downstream to the confluence of Singer and Pine Creeks. No carcasses were recovered and no live fish were seen. No fall-run salmon were known to have spawned in Singer Creek in 1974 (Appendix Table 4).

Coyote Creek (Fall Run)

Approximately 100 live fall-run salmon were observed spawning immediately downstream from the Tehama-Colusa Fish Facility Terminal Collection Station in November and December, 1974 (Appendix Table 4). We plan to conduct carcass-recovery surveys in Coyote Creek in 1975 if money and manpower limitations permit.

SACRAMENTO RIVER AND TRIBUTARIES, CHICO CREEK AND SOUTHWARD (Figure 2)

Chico Creek

by

Richard Flint
Region 2

Spring Run

Thirty-five live salmon were observed during a SCUBA survey of Higgins Hole, above Ponderosa Way, on September 6, 1974. No other surveys were conducted on Chico Creek in 1974. The estimated escapement was 100 salmon.

Fall Run

No counts or estimates were made.

Butte Creek

by

Richard Flint and Jerome R. Staley
Region 2

Spring Run

Flooding in January and March, 1974 caused extensive channel changes, particularly in the area of Butte Creek Rock Company's gravel operations. The creek bed scoured 1 m (3 ft) deeper downstream from Parrott-Phelan Diversion Dam. The ladder there was operable for at least part of the spring season. Five large spring-run salmon were observed in the ladder on May 7.

Butte Creek was surveyed October 1 and 2 from Centerville Powerhouse to the Skyway Bridge. Weather and recovery conditions were good. We saw 31 live and 16 dead salmon, and 35 multiple and 19 single redds. The spring-run escapement is estimated to be 150 fish.

Fall Run

On November 4, 1974, 70 live salmon were counted between Gorrill and Western Canal Dams. There were no fish above Gorrill at that time. Flows were too low for fall-run fish to migrate past Gorrill Dam. Subsequently, four carcass surveys were conducted during November and December between Durham Mutual Dam and Western Canal Dam, during which a total of 45 carcasses was recovered. The fall-run spawning escapement was estimated to be 200 fish.

Feather River

by

Lynn Wixom
Region 2

Spring Run

We observed eight spring-run carcasses during the period July through August, 1974. This is the largest "holding loss" observed since 1968 when we began conducting summer surveys. A total of 198 spring-run salmon entered Feather River Hatchery. Spring-run salmon spawning in the river are included in the fall-run estimates.

Fall Run

In the summer of 1974, a channel was cut through a bar located in the river bed adjacent to Feather River Hatchery. The work was done to increase available spawning gravel in the upper portion of the river, where spawning density is high.

To determine the 1974 spawning population using this channel we installed a fence at the downstream end which allowed live fish to move upstream, but caught drifting carcasses. We surveyed the entire length of the channel and fence each week, and recovered a total of 1,218 carcasses. We assumed we recovered 100% of the fish using this channel.

Fourteen survey trips were conducted in the remainder of the Feather River, from October 7, 1974 through January 8, 1975. All but two of these surveys extended from the new spawning channel downstream to Honcut Creek. Recovery conditions were poorer than normal for the area between the Oroville Barrier and Thermalito Outlet, since the river flow was 23 m^3/sec (800 cfs) instead of the normal 11 m^3/sec (400 cfs). Carcass tagging was done to correct for recovery rates at the higher than normal flows.

Downstream from Thermalito Outlet, flows ranged from 99 to 283 m^3/sec (3,500-10,000 cfs). We recovered 13,684 carcasses on the river surveys, representing an estimated 59,300 carcasses.

A total of 5,428 fall-run fish entered Feather River Hatchery. These, plus the 1,218 spawning in the channel adjacent to the hatchery, and the estimated 59,300 spawning in the remainder of the river, bring the total estimated fall-run spawning population to 65,946 (Appendix Table 6).

A total of 87 fin-clip marked salmon carcasses were recovered. Eighty of these were found upstream from the Thermalito outlet (12 of which were in the new river channel). The remaining seven were recovered above Gridley Bridge. Four fin-clipped steelhead carcasses were recovered (Table 2).

Table 2

Fin-marked Salmon and Steelhead Carcasses Recovered in the Feather River, 1974

Salmon		Steelhead	
Mark	Number	Mark	Number
AD	3	Ad-LP-RV	4
Ad-LV	1		
Ad-RV	3		
An	1		
An-LP	46		
An-RP	1		
RV	1		
RV-LP	1		
LP	3		
RP	27		

Yuba River

by

Ronald Rogers
Region 2

Fall Run

The annual Yuba River survey was conducted from October 21 through December 18, 1974. The survey area consisted of five sections as follows:

Section number	Description
1	Blue Point Mine to Highway 20 Bridge
2	Highway 20 Bridge to Daguerre Point Dam
3	Daguerre Point Dam to Hallwood Avenue
4	Hallwood Avenue to Plantz Road
5	Plantz Road to Marysville Dump

Nine survey trips were made. During survey trips 2 through 9 fresh carcasses were marked and released for later recovery to aid in making a population estimate. Section 4 was not surveyed on trips 8 or 9. Section 5 was not surveyed on trips 1, 2, 3, 8, and 9 (Table 3).

Table 3

Summary of Tag and Recovery Data, Yuba River, 1974

Recovery period	Tagging period: Oct. 28-30	Nov. 4-6	Nov. 11-13	Nov. 18-20	Nov. 25-27	Dec. 2-4	Dec. 9-11	Tags recovered	Fish recovered
Oct. 21-23								0	82
Oct. 28-30								0	252
Nov. 4- 6	10							10	777
Nov. 11-13	2	21						23	1,043
Nov. 18-20		1	7					8	438
Nov. 25-27				4				4	107
Dec. 2- 4				3	2			5	105
Dec. 9-11			2					2	92
Dec. 16-18						1	1	2	109
TOTAL MARKS RECOVERED	12	22	9	7	2	1	1	54	
TOTAL MARKED	70	69	87	65	23	32	5	Total marked = 351	

The flows during the first four survey periods were about 17 m^3/sec (600 cfs) with an increase to 119 m^3/sec (4,200 cfs) in late November. They then slowly receeded to 96 m^3/sec (3,400 cfs) at the end of the survey. The water was clear except for survey period six.

The spawning escapement for the mark and recapture portion of the survey was estimated using calculations similar to those used by Schaefer (1951) and reported in Taylor (1974).

The estimated spawning escapement was 17,809. The estimates of the proportions of the run spawning in the various sections are based on the percentages of the carcasses found in each section (Appendix Table 6).

American River

by

Robert Reavis
Region 2

Weekly carcass-recovery surveys were conducted in the American River between Nimbus Racks and Watt Avenue, from October 31, 1974 through January 3, 1975. The survey area was divided into two sections (each approximately the distance the survey crew could cover in one day). The upper section ran between the Nimbus Racks and the Sunrise Gravel Bridge. The lower section ran between the Sunrise Gravel Bridge and Watt Avenue.

Water conditions throughout the survey were excellent. Flows were generally low and the water was clear.

During this year's survey, fresh carcasses were marked and released for later recovery (Table 4).

Table 4

Summary of Tag and Recovery Data American River, 1974

Recovery period	Oct. 31	Nov. 7-8	Nov. 14-15	Nov. 21-22	Nov. 26-27	Dec. 5-6	Dec. 12-13	Dec. 18-19	Tags recovered	Fish recovered
Nov. 7- 8	2								2	336
Nov. 14-15		11							11	1,053
Nov. 21-22		1	16						17	1,154
Nov. 26-27				13					13	1,219
Dec. 5- 6				2	6				8	1,939
Dec. 12-13						12			12	1,429
Dec. 18-19						4	4		8	1,015
Dec. 26-27								1	1	595
TOTAL MARKS RECOVERED	2	12	16	15	6	16	4	1	72	
TOTAL MARKED	32	69	74	82	38	75	29	8		

The spawning escapement for the river was estimated using calculations similar to those used by Schaefer (1951). The spawning escapement below the Nimbus Racks was estimated to be 52,491 fish. From the upper side of the Nimbus Racks, 939 carcasses were counted. Assuming an 85% recovery rate, there were an estimated 1,105 fish above the racks. A total of 8,200 salmon were counted into Nimbus Hatchery. This brings the total estimate in the American River to 61,796 (Appendix Table 6).

LOWER SAN JOAQUIN RIVER TRIBUTARIES
(Figure 3)

Cosumnes River

by

Robert Reavis

Fall Run

Cosumnes River water flows were low throughout the salmon spawning season. They ranged from 0.8 to 1.4 m^3/sec (30 to 50 cfs). These low flows probably made upstream migration very difficult. The fish seemed to migrate into the stream over a much longer period than in past years.

Four carcass-recovery surveys were conducted between November 11 and December 27, 1974. A total of 57 carcasses was counted. Based on an estimated recovery rate of 20%, the total run was 285 (Appendix Table 7).

Mokelumne River

by

Marcus Sazaki
Region 2

Fall Run

Nine weekly carcass-recovery surveys were made on the Mokelumne River this year from October 30 through December 24, 1975. The 1974 survey area was from the Mokelumne River Fish Installation to the Elliot Road Bridge. Flows were good for observing carcasses, generally decreasing, and ranged from 25 to 6 m^3/sec (900-225 cfs).

We observed 179 carcasses, 61 of which were tagged and released. Only nine tagged carcasses were later recovered. Eight of the recovered tags were found the week after release and one tag was recovered two weeks after release.

This year's estimate of river spawners is 1,200 fish.

An additional 222 fish entered the Mokelumne River Spawning Channel, bringing the total estimated 1974 escapement to 1,422 fish.

UPPER SAN JOAQUIN RIVER TRIBUTARIES
(Figure 3)

by

James Horton
Region 4

Stanislaus River

The estimated 1974 salmon run on the Stanislaus River was 750 fish, quite low compared to the ten year (1964-73) average of 6,700 (Appendix Tables 1 and 7).

Three carcass-recovery surveys were conducted between November 11, 1974, and December 11, 1974. The survey area was divided into four sections as follows:

Section 1 - Goodwin Dam to Knights Ferry,
Section 2 - Knights Ferry to Orange Blossom Bridge,
Section 3 - Orange Blossom Bridge to Oakdale, and
Section 4 - Oakdale to Riverbank.

The flow was lowered from about 11 m^3/sec (400 cfs) to about 1.4 m^3/sec (50 cfs) on October 30, 1974, for installation of the salmon trap above Orange Blossom Bridge. The flow was then adjusted upward to 4.2 m^3/sec (150 cfs) while the trap was in operation (November 4 to November 20). After removal of the trap, flows increased to more than 57 m^3/sec (2,000 cfs) making carcass recovery difficult. The water was clear until November 20. After that date the water was muddy.

Thirty-seven salmon were trapped; 15 females, 20 males, and 2 grilse. Six females and three males were spawned; the others were returned to the river. The eggs were taken to Mocassin Creek Hatchery.

Forty carcasses were tagged on the first survey trip and five recovered on the second survey trip (12.5%). Thirty-five carcasses were tagged on the second survey. No tag recoveries were made on the third survey. A total of 85 carcasses were examined, including the 5 tagged fish (Table 5).

Table 5

Summary of Observations During Spawning Stock Surveys, Stanislaus River, 1974

Date	Stream section	Estimated streamflow (m^3/sec)	Water temp. (C)	Carcasses observed (incl. 5 tag recoveries)						
					51.3 cm FL		51.3-60.7 cm		60.7 cm	
				Skel.	Male	Female	Male	Female	Male	Female
1974										
Nov. 11	2	4.0	15		7		7		12	8
Nov. 12	3	4.0	13.5						2	3
Nov. 13	4	4.0	13.5							1
Nov. 14	1	4.0	13.5							
Nov. 20/21	2	4.2	14	19	2		3		4	5
Nov. 20	3	4.2	13	6			1			3
Nov. 22	4	4.2	13							
Dec. 11	1	57								
Dec. 11	2	57								
TOTAL				25	9	0	11	0	18	23

Tuolumne River

Fall Run

An estimated 1,150 fall-run king salmon spawned in the Tuolumne River in 1974 (Appendix Table 7). This is the smallest estimated Tuolumne River spawning escapement since 1963, when the run was estimated to be 100 fish. The average over the previous 10 years is 10,500 (Appendix Table 1).

The spawning population was estimated from carcass-recovery surveys. On six survey trips between November 6, 1974 and January 8, 1975 we examined 90 carcasses. We tagged 84 of these, and seven were subsequently recovered (Table 6).

Our survey area was partitioned into three sections as follows:

Section 1 - La Grange to Rairden's Ranch,
Section 2 - Rairden's Ranch to Robert's Ferry Bridge, and
Section 3 - Robert's Ferry Bridge to Reed Rock Plant.

Streamflows during the survey period were quite variable, ranging from 5.3 to over 100 m^3/sec (500-4,000 cfs). The water was clear, however on all survey trips.

Table 6

Summary of Observations During Spawning Stock Surveys, Tuolumne River, 1974

Date	section	Stream flow (m^3/sec)	Water temp. (C)	Untagged carcasses recovered						Carcasses tagged and tag nos.	Tag numbers of tagged carcasses recovered
				Skel.	51.3 cm (FL) Male	51.3 cm (FL) Female	51.3-60.7 cm Male	51.3-60.7 cm Female	60.7 cm Male	60.7 cm Female	
1974											
Nov. 6	1	15.3	15.0							2	2(B1,B2)	
Nov. 6,7	2	15.3	15.0						1		1(B3)	
Nov. 7	3	15.3	15.0								0	
Nov. 18	1	15.3	12.8	1	1		2		8	5	17(1-17)	
Nov. 18,19	2	15.3	12.8	1				1	2	2	6(18-23)	
Nov. 19	3	15.3		3					3	4	10(24-32,34)	
Dec. 4	1	22.6		1					3	12	16(40-55)	#7
Dec. 4,5	2	22.6		1					6	5	12(56-67	#22
Dec. 5	3	22.6		4	1				1	5	11(68-78)	#29
Dec. 19	1	25.5		1					2	3	5(80-84)	
Dec, 19,20	2	46.7		1					2		2(85,86)	#58,56,21
Dec. 20	3	46.7		2					1		1(87)	#70
1975												
Jan. 2	1	56.6-113.2	11.8							1	1(90)	
Jan. 2,3	2	56.6-113.2										
Jan. 3	3	56.6-113.2										
Jan. 7	1	56.6-113.2	11.8							1		
Jan. 7,8	2	56.6-113.2										
Jan. 8	3	56.6 113.2										
TOTALS				15	2	0	2	1	29	40	84	

Merced River

The Merced River salmon run was estimated at 2,000 fish; including an estimated 1,000 using the spawning channel at the Merced Fish Facilities.

The survey was conducted between November 14, 1974, and January 13, 1975, and was partitioned as follows:

Section 1 - Crocker Huffman Dam to Highway 59 Bridge, and
Section 2 - Highway 59 Bridge to Bettencourt's Ranch. In past years surveys have extended downstream to Cressey Bridge. Due to hyacinth blocks, the river below Bettencourt's Ranch could not be surveyed this year.

Streamflows were high throughout the survey making carcass recovery difficult. Flows ranged from 14 to 71 m^3/sec (500-2,500 cfs).

We tagged 96 carcasses of which 5 tags were recovered on later surveys. About half of the carcasses were found near the spawning channel outlet. Approximately 400 redds were counted within the spawning channel. We examined a total of 109 carcasses and skeletons including the 5 previously tagged (Table 7).

Size and sex composition of carcasses was as follows:

Table 7

Summary of Observations During Spawning Stock Surveys, Merced River, 1974

	Stream section	Water clarity	Water temp. (C)	Carcasses observed (incl. 5 tagged carcasses)						
					51.3 cm FL		51.3-60.7 cm		60.7 cm	
				Skel.	Male	Female	Male	Female	Male	Female
1974										
Nov. 14	1	clear	13.0				1		9	3
Nov. 15	2	muddy	13.5		1				6	2
Nov. 25	1	clear	12.5	5			1		7	12
Nov. 26	2	muddy								
Dec. 9	1	clear		9	4			3	19	21
Dec. 10	2	muddy			1					
1975										
Jan. 9	1	clear		3						2
Jan. 10	2	muddy								
Jan. 13	2	muddy								
TOTAL				17	6	0	2	3	41	40

SUMMARY

During 1974 the California Department of Fish and Game conducted its 22nd annual king salmon spawning stock inventory of the Sacramento-San Joaquin River system.

This report deals with the four races of king salmon recognized in the Central Valley: spring, fall, late-fall and winter runs.

In the San Joaquin system and the lower Sacramento River system, spawning stock estimates were done by the California Department of Fish and Game. These estimates were based on carcass counts, aerial redd counts, and live fish counts. Estimates for the Sacramento River above Red Bluff Diversion Dam were based primarily on U. S. Fish and Wildlife Service counts of fish passing the dam, and on Department of Fish and Game sampling at the dam.

The estimated 1974 Central Valley king salmon spawning escapement was 268,673 fish (Table 8).

Table 8

Sacramento-San Joaquin System King Salmon Spawning Population, 1974

Spawning area	Spring run	Fall run	Late-fall run	Winter run	Combined
Sacramento main stem*	3,800	77,223	6,083**	18,536**	105,642
Sacramento tributaries	5,448	151,976			157,424
San Joaquin tributaries		5,607			5,607
TOTALS	9,248	234,806	6,083**	18,536**	268,673

* Includes some fish spawning in tributaries above Red Bluff Dam.

** There were prolonged lapses in counting at Red Bluff Diversion Dam during the period that late fall- and winter-run fish were migrating past the dam in early 1974. The 6,083 late fall- and 18,536 winter-run figures for 1974 represent unknown proportions of the total 1974 runs of these fish, and are not comparable to estimates in prior years.

Fall- and spring-run salmon spawn at about the same time, hence these two races cannot always be distinguished on the spawning grounds. However, estimates for the combined fall and spring runs are available for the comparison of all years since 1953 (Taylor, 1974). The 1974 fall-spawning (fall- plus spring-run) population in California's Central Valley was 244,054 fish. This figure is 81% of the historic (1953-73) average of 301,000, and is down 14% from last year's estimate of 283,000.

Above Red Bluff Diversion Dam, the fall-spawning escapement of 56,954 was down approximately 2,000 fish from last year. This is the fifth consecutive year that the fall-spawning populations have been far below historic levels (from 1964 through 1969 fall-spawning populations above Red Bluff averaged 129,000).

As was the case last year, the lower than normal escapement above Red Bluff was somewhat offset by higher than normal escapements in the lower Sacramento system. An estimated 27,970 fish spawned in the Sacramento main stem below Red Bluff Diversion Dam. This is the greatest number of spawners in this area in recent years. Spawning escapements in the Feather, Yuba, and American Rivers were also well above average. The runs in these three major Sacramento River tributaries comprised 60% of the 1974 Central Valley fall-spawning salmon populations.

Runs in the San Joaquin River system (including the Cosumnes and Mokelumne Rivers) totaled 5,607, compared to an average of 22,567 over the prior 10 years. Of these, 2,000 spawned in the Merced River, compared to 1,000 spawners in the Merced last year. The runs in each of the remaining San Joaquin tributaries were far below average. In the Stanislaus and Tuolumne Rivers the fall runs were the lowest observed since 1963.

REFERENCES

Ricker, W. E. 1958. Handbook of computations for biological statistics of fish populations. Fish. Res. Bd. Canada. Bull. No. 119. 300 p.

Schaefer, Milner B. 1951. Estimation of the size of animal populations by marking experiments. U. S. Fish and Wildlife Service, Fish. Bull. 52: 189-203.

Taylor, Steven N. (Editor). 1974. King (chinook) salmon spawning stocks in California's Central Valley, 1972. Calif. Dep. Fish and Game., Anad. Fish. Admin. Rep. 74-6, 32 p.

Van Woert, William. 1966. Central Valley salmon and steelhead catch, 1964-65. Calif. Dep. Fish and Game, Marine Res. Admin. Rep. 66-5, 7 p.

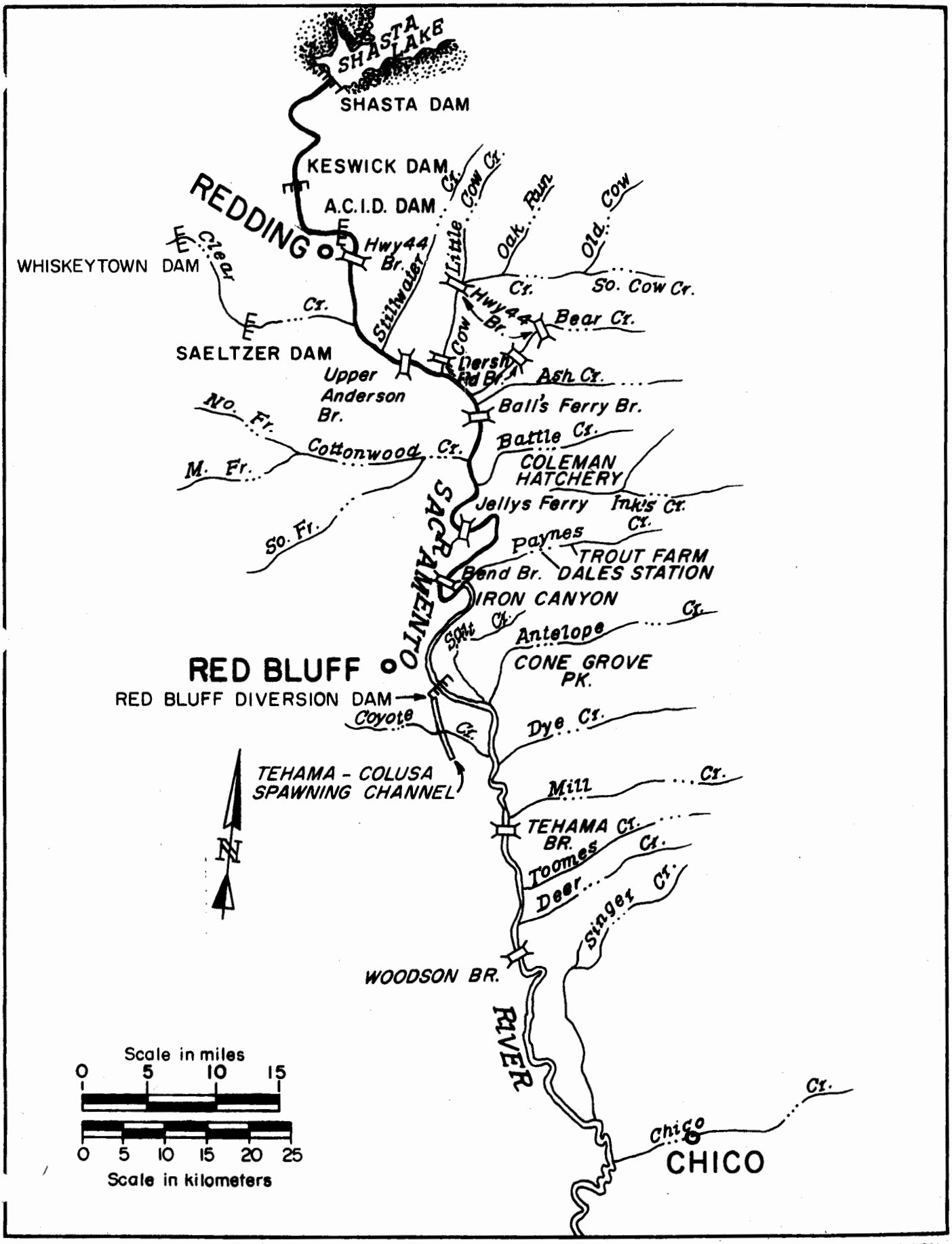

Figure 1. Upper Sacramento River and tributaries above Chico Creek

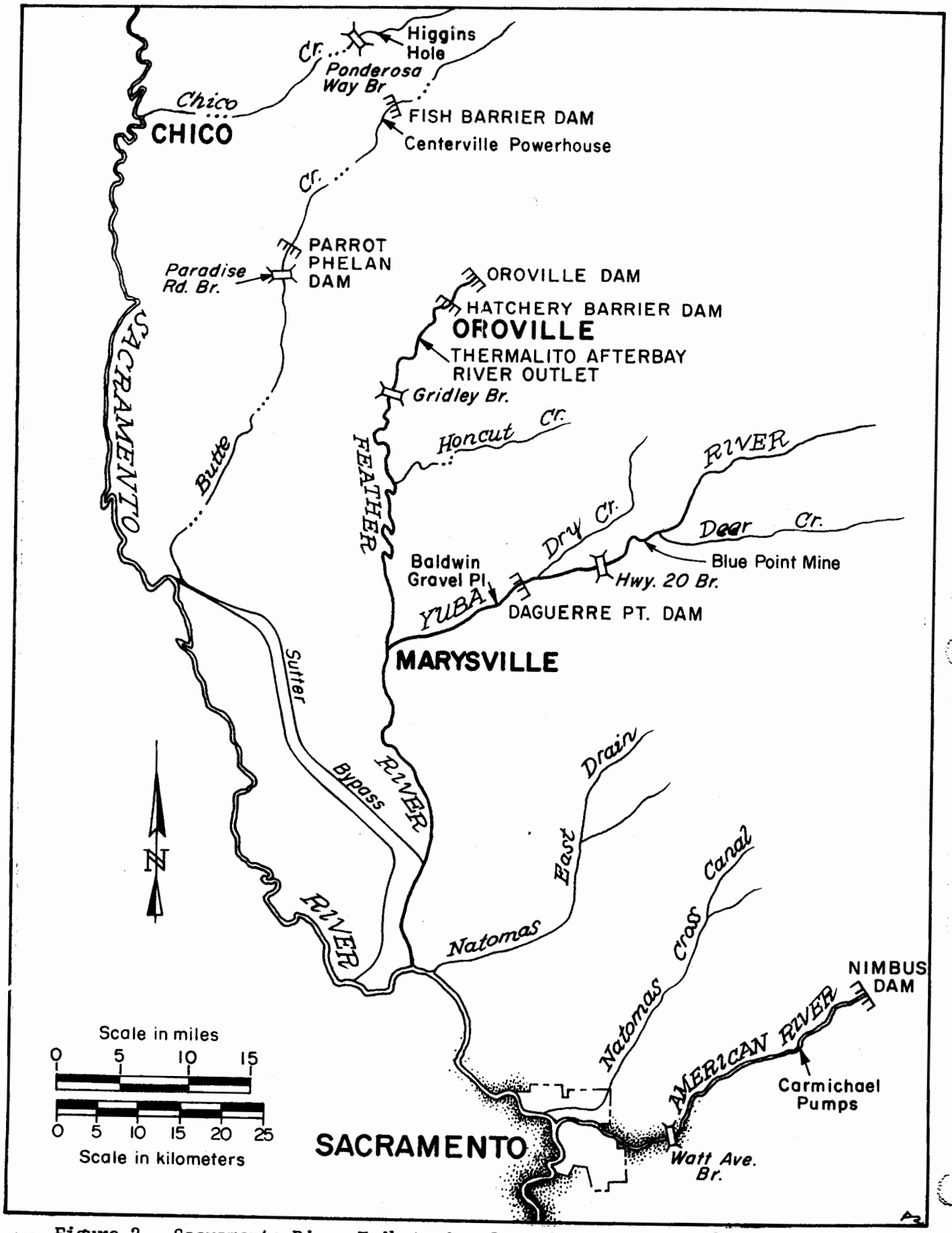

Figure 2. Sacramento River Tributaries from Chico Creek south

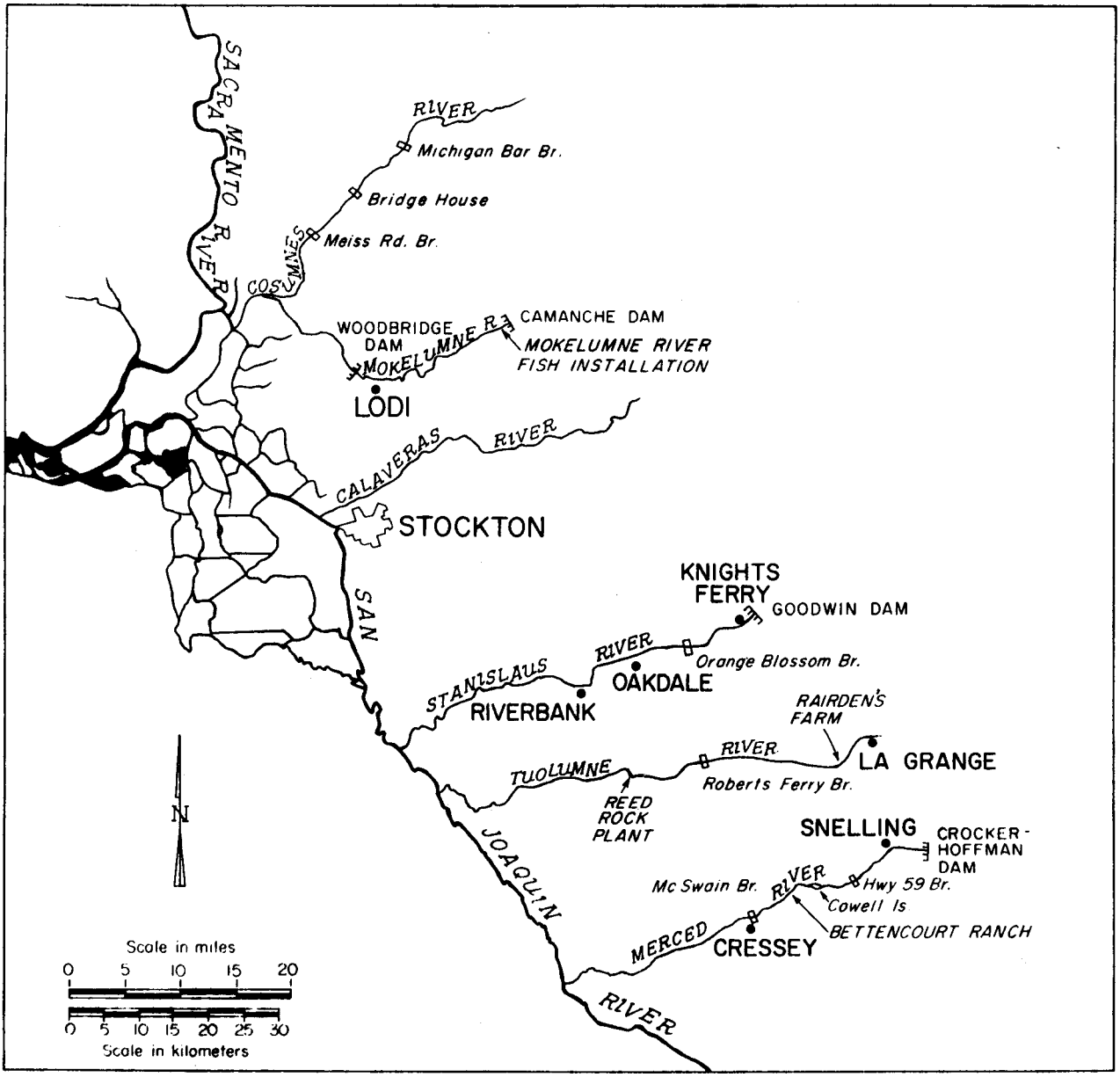

Figure 3. San Joaquin River tributaries

List of Appendix Tables

Appendix Table 1

Sacramento-San Joaquin Valley King Salmon
Spawning Stock Estimates, 1964-1974, in Thousands of Fish

	Sacramento River system above Red Bluff, excluding Battle Creek				Battle Creek		Sacramento main stem below Red Bluff	Feather River		Yuba River	American River	Cosumnes River	Mokelumne River	Stanislaus River	Tuolumne River	Merced River	Others[1]
Year	Fall	Spring	Late fall	Winter	Fall	Spring	Fall	Fall	Spring	Fall	Fall	Fall	Fall	Fall	Fall	Fall	All races combined
1964	150a	b	b	b	16	b	6	38a	3	35	59	2	2	4	2	0.04	7
1965	107a	b	b	b	9	b	2	23a	0.7	10	39	0.8	1.3	2	3	0.09	2
1966	124a	b	b	b	3	b	3	21a	0.3	8	27	0.6	0.7	3	5	0.04	1
1967	84a	b	b	b	5	b	9	12a	0.1	24	23	0.5	3	12	7	0.6	1
1968	116a	b	b	b	6	b	12	18a	0.2	7	31	1.5	1.7	6	9	0.5	2
1969	130	20	b	b	6	b	18	61a	0.3	5	47	4	3	12	32	0.6	5
1970	70	4	b	b	7	b	6	62a	0.2	14	37	0.6	5	9	18	5	5
1971	59	6	17	53	5	b	23	47a	0.5	6	52	0.5	5	14	22	4	5
1972	36	7	33	28	5	b	15	47a	0.3	9	25	1.6	1.1	4	5	3	3
1973	44	7	22	23	8	b	17	74a	0.2	24	95	0.9	3	1.2	2	1.1	6
1974	49	4	6	19	4	b	28	66	0.2	18	62	0.3	1.4	0.8	1.1	2	8

1/ This includes streams which a few hundred king salmon enter most years (e.g., Mill, Deer, and Dye Creeks) as well as streams which king salmon enter only in wet years (e.g., Dry, Singer, and Dye Creeks, and the Calaveras River).
a/ Some spring-run fish may have been included in the fall-run estimate.
b/ No estimate.

Appendix Table 2

RED BLUFF DIVERSION DAM WEEKLY ADJUSTED SALMON COUNTS,
December 30, 1973 through December 28, 1975

Week		Adjusted salmon count	Number sampled	Late fall run %	Late fall run Number	Winter run %	Winter run Number	Spring run %	Spring run Number	Fall run %	Fall run Number
1973 Oct. 14-Dec. 29					1,268[a]						
1974 Dec. 30-Jan.	5	239	0	95.4[b]	228	4.6[b]	11				
Jan. 6-Jan.	12	521	87	95.4	497	4.6	24				
13-	19	High and turbid water made counts impossible during this period.									
20-	26										
27-Feb.	2										
Feb. 03-	09										
10-	16										
17-	23										
24-Mar.	2	1,405	202	95.5	1,342	4.5	63				
Mar. 3-	9	1,241[b]	36	44.4	551	55.6	690				
10-	16	913[b]	210	33.3	304	66.7	609				
17-	23	749	0	26.0[b]	195	74.0[b]	554				
24-	30	3,773	413	18.6	702	81.4	3,071				
31-Apr.	6	2,363[b]	0	18.1[b]	428	81.9[b]	1,935				
Apr. 7-	13	952	0	15.7[b]	149	84.3[b]	803				
14-	20	2,683	66	9.1	244	90.9	2,439				
21-	27	4,720	783	8.3	392	85.8	4,050	5.9	278		
28-May	4	2,050	521		6,300[c]	90.8	1,861	9.2	189		
May 5-	11	1,139	34			82.4	939	17.6	200		
12-	18	614	80			82.5	507	17.5	107		
19-	25	1,062	183			72.7	772	27.3	290		
26-Jun.	1	487	33			42.4	206	57.6	281		
Jun. 2-	8	497	47			44.7	222	55.3	275		
9-	15	305	20			45.0	137	55.0	168		
16-	22	165	13			23.1	38	76.9	127		
23-	29	251	31			22.6	57	77.4	194		
30-Jul.	6	207	13			38.5	80	61.5	127		
Jul. 7-	13	273	0			10.1[b]	28	72.7[b]	198	17.2[b]	47
14-	20	338	86			5.8	20	74.4	251	19.8	67
21-	27	502	60					46.7	234	53.3	268
28-Aug.	3	346	24				19,116[c]	33.3	115	66.7	231
Aug. 4-	10	336	13					15.4	52	84.6	284
11-	17	248	0					16.7[b]	41	83.3[b]	207
18-	24	937	0					16.7[b]	156	83.3[b]	781
25-	31	871	0					16.7[b]	145	83.3[b]	726
Sep. 1-	7	1,910	119					16.8	321	83.2	1,589
8-	14	2,099	46					8.7	183	91.3	1,916
15-	21	3,127	647							100.0	3,127
22-	28	5,941	617						3,932	100.0	5,941
29-Oct.	5	5,210	666							100.0	5,210
Oct. 6-	12	4,993	776							100.0	4,993
13-	19	6,209	1,045							100.0	6,209
20-	26	5,460	1,141	1.8	98					98.2	5,362
27-Nov.	2	5,287	1,148	3.2	169					96.8	5,118
Nov. 3-	9	4,143	736	11.1	460					88.9	3,683
10-	16	3,460	494	16.0	554					84.0	2,906
17-	23	3,746	647	19.5	730					80.5	3,016
24-	30	2,680	295	37.3	1,000					62.7	1,680
Dec. 1-	7	4,327	354	66.1	2,860					33.9	1,467
8-	14	1,857	407	95.3	1,770					4.7	87
15-	21	1,367	360	88.1	1,204	8.8	120			3.1	43
21-	28	1,321	158	85.4	1,128	14.6	193			.0	0
TOTAL 1974		93,324	12,611		15,005[c]		19,429[c]		3,932		54,958

[a] Portion of run passing dam during previous calendar year. For weekly breakdown of numbers see 1973 Central Valley Spawning Stock Estimates (Taylor 1974).
[b] Determined by interpolation.
[c] Does not include any fish which may have passed the Dam from January 13 through February 23, 1975.

[ ] Prospective 1974 (only) spawners passing Red Bluff Diversion Dam.

Appendix Table 3

King Salmon Spawning Populations,
Main Stem* Sacramento River, 1974

	Spring run	Fall run	Late-fall run	Winter run	TOTAL
Trapped at Keswick Dam (and hauled to Coleman Hatchery)		1,429	637		2,066
Keswick Dam to Red Bluff Diversion Dam	3,800	45,590	5,446**	18,536**	73,372
Tehama-Colusa Spawning Channel (trapped at Red Bluff Diversion Dam)		2,234			2,234
Total, Keswick Dam to Red Bluff Diversion Dam	3,800	49,253	6,083**	18,536**	77,672**
Red Bluff Diversion Dam to Tehama	No. Est.	19,210	No. Est.	No. Est.	19,210
Tehama-Colusa Spawning Channel (entered via Coyote Creek)		843			843
ehama to Woodson Bridge	No. Est.	7,917	No. Est.	No. Est.	7,917
Total, Red Bluff Dam to Woodson Bridge	No. Est.	27,970	No. Est.	No. Est.	27,970
TOTAL, SACRAMENTO MAIN STEM	3,800	77,223	6,083**	18,536**	105,642**

* Includes some fish spawning in tributaries other than Battle Creek above Red Bluff Diversion Dam.

** Estimate does not include any late fall- or winter-run fish passing the dam January 13-February 23.

Appendix Table 4

Fall- and Spring-run King Salmon Counts and Spawning Population Estimates, Upper Sacramento River Tributaries* (North of Chico Creek) 1974

Stream or stream section	Estimated carcass recovery rate (%)	Counting trips	Carcasses recovered	Live fish observed	Estimated spawning population		Fall plus spring run
					Spring run	Fall run	
Battle Creek (Total)							3,901**
Coleman Hatchery	Fish were counted at the hatchery				0	1,607	
Below Coleman Hatchery	62	16	1,172	309	No. Est.	1,903	
Gover's Irrigation Ditch	74	16	288	82	No. Est.	391	
Other tributaries, Keswick Dam to Red Bluff*					No. Est.*	No. Est.*	No. Est.*
Antelope Creek (Total)							580
Main stem	10	10	44	56	No. Est.	440	
Craig Creek	10	5	14	1	No. Est.	140	
New Creek		1	0	0	No. Est.	0	
Mill Creek (lower)	25	13	236	226	0	944	2,444
Mill Creek (upper)	1	7	5	119	1,500	0	
Deer Creek (lower)	25	13	160	69		640	4,140
Deer Creek (upper)	0	7	0	212	3,500	0	
Dry Creek	77	7	46	6	No. Est.	60	60
Dye Creek	-	7	0	0	No. Est.	No. Est.	No. Est.
Salt Creek	-	3	0	0	No. Est.	No. Est.	No. Est.
Singer Creek	-	6	0	0	No. Est.	0	0
Coyote Creek	-	0	0	100	0	100	100
TOTAL, Sacramento River tributaries north of Chico Creek					5,000	6,225	11,225

* Fish spawning in tributaries above Red Bluff Diversion Dam, except Battle Creek, are included in the main stem estimate (Appendix Table 3).

** Does not include 1,429 fish hauled to Coleman Hatchery from the Keswick Trap. These fish are included in the main stem estimate.

Appendix Table 5

Redds Counted During Two Airplane Flights, Main Stem Sacramento River above Vina, October 24 and November 8, 1974

Area	Number of redds observed	Percent
Keswick Dam to A.C.I.D. Dam	5	0.8
A.C.I.D. Dam to Highway 44	21	3.3
Highway 44 to Upper Anderson Bridge	100	15.5
Upper Anderson Bridge to Balls Ferry	95	14.7
Balls Ferry to Jellys Ferry	94	14.6
Jellys Ferry to Bend Bridge	59	9.1
Bend Bridge to Red Bluff Diversion Dam	20	3.1
Red Bluff Diversion Dam to Tehama	226	35.0
Tehama to Vina	25	3.9
TOTAL	645	100.0

Appendix Table 6

Fall- and Spring-run King Salmon Counts and Population Estimates, Lower Sacramento Tributaries (Chico Creek and South) 1974

Stream or Stream Section	Number of counting trips	Carcasses counted	Population estimates		
			Spring run	Fall run	Total
Chico Creek (Total)	1	35*	(100)	No Est.	100
Butte Creek (Total)			(150)	(200)	350
Centerville Powerhouse to Skyway Bridge	1	16	150	No. Est.	
Durham Mutual Dam to PG&E	4	45	No. Est.	200	
Feather River (Total)			(198)	(65,946)	66,144
Oroville Barrier to Thermalito Outlet	14	8,302		21,600	
Thermalito Outlet to Gridley Bridge	13	4,948		34,900	
Gridley Bridge to Honcut Creek	12	434		2,800	
Feather River Hatchery	-	-	198	5,428	
Feather River Spawning Channel	-	1,218		1,218	
Yuba River (Total)				(17,809)	17,809
Blue Point Mine to Highway 20 Bridge	9	223		1,346	
Highway 20 Bridge to Daguerre Point Dam	9	1,054		6,361	
Daguerre Point Dam to Hallwood Avenue	9	1,281		8,665	
Hallwood Avenue to Marysville Dump	7	238		1,437	
American River (Total)				(61,796)	61,796
Nimbus Racks to Sunrise Boulevard Bridge	10	4,955		32,028	
Sunrise Boulevard Bridge to Watt Avenue Bridge	10	3,807		20,463	
Above Nimbus Racks	-	939		1,105	
Nimbus Hatchery	-	-		8,200	
TOTAL, Lower Sacramento River Tributaries			448	145,751	146,199

* Live fish.

Appendix Table 7

Fall-run King Salmon Counts and Population Estimates
San Joaquin River Tributaries, 1974

Stream or stream section	Counting trips	Carcasses counted	Estimated spawning population
Cosumnes River (Total)		57	(285)
Michigan Bar to Bridgehouse	3	19	95
Bridgehouse to Meiss Road	4	38	190
Mokelumne River (Total)		401	(1,422)
Camanche Dam to Elliot Road	9	179	1,200
Mokelumne River Fish Installation	-	222	222
Stanislaus River (Total)			(750)
Goodwin Dam to Knight's Ferry	2	0	
Knight's Ferry to Orange Blossom Bridge	3	69	
Orange Blossom Bridge to Oakdale	2	15	
Oakdale to Riverbank	2	1	
Trapped at Orange Blossom Bridge	-		37
Tuolumne River (Total)			(1,150)
LaGrange to Rairden's Farm	6	43	
Rairden's Farm to Robert's Ferry Bridge	6	23	
Robert's Ferry Bridge to Reed's Rock Plant	6	24	
Merced River (Total)			(2,000)
Crocker-Huffman Dam to Highway 59 Bridge	4	99	
Highway 59 Bridge to Bettencourt's Ranch	5	10	
Merced River Spawning Channel	-		1,000
TOTAL, San Joaquin Tributaries			5,607